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PRESCHOOLERS' COMPLIANCE WITH SIMPLE INSTRUCTIONS: A DESCRIPTIVE AND EXPERIMENTAL EVALUATION

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Compliance is often used to describe a situation in which a child completes instructions from adults, and low levels of compliance are a common teacher concern. We conducted a descriptive assessment that showed that compliance was relatively stable for individual children, variable across children, and positively correlated with age. The impact of six antecedent variables (proximity, position, physical contact, eye contact, vocal attention, and play interruption) on compliance was assessed for 4 children. Next, the effects of three-step prompting were assessed alone, in combination with the antecedent variables, and at different integrity levels for 2 children. Results of the experimental analyses showed that compliance gradually increased with the addition of each antecedent variable for 2 of the 4 children. Three-step prompting in combination with the six antecedent variables increased compliance for the remaining 2 children, and high compliance levels were maintained until treatment integrity was decreased to 20% of full strength. The utility of this naturalistic compliance assessment is discussed, as are the relevant experiences that give rise to acceptable levels of compliance in preschool classrooms.

Key words: antecedent intervention, compliance, preschoolers, three-step prompting, treatment integrity

Noncompliance is a term that is used to describe a situation in which a child does not complete instructions; this behavior is a common concern of teachers (e.g., Austin & Agar, 2005; Hamlet, Axelrod, & Kuerschner, 1984; Schutte & Hopkins, 1970). In a survey of 3,305 kindergarten teachers, Lin, Lawrence, and Gorrell (2003) found that 78% of teachers rated ''follows directions'' as ''very important'' and ''essential'' kindergarten entry-level skills. Only the domains of ''tells needs and thoughts'' and ''is not disruptive'' were rated higher. Heaviside and Farris (1993) found that over half of the 1,339 kindergarten teachers they surveyed noted that compliance was an important factor for kindergarten readiness. Although compliance appears to be a very important skill, noncompliance appears to be prevalent among preschool-aged children (Roberts & Powers, 1988; Webster-Stratton, 1983).

The literature provides multiple methods with which to measure compliance that rely on different initiation (Brumfield & Roberts, 1998; Forehand & King, 1977; Roberts, 1985) and completion criteria ranging from 5 to 30 s (Austin & Agar, 2005; Brumfield & Roberts; Forehand & King; Goetz, Holmberg, & LeBlanc, 1975; Ndoro, Hanley, Tiger, & Heal, 2006; Neef, Shafer, Egel, Cataldo, & Parrish, 1983; Parrish, Cataldo, Kolko, Neef, & Egel, 1986; Peed, Roberts, & Forehand, 1977; Roberts & Powers, 1988; Schutte & Hopkins, 1970; Wilder, Atwell, & Wine, 2006). To address the definition and measurement differences across studies, Wruble, Sheeber, Sorenson, Boggs, and Eyberg (1991) described an empirical approach to assess compliance by measuring both the initiation and completion of instructions. In their study, the compliance latencies of 15 typically developing children between the ages of 3 and 5 years (who were not referred for problems with compliance) were

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evaluated under various instructional conditions (e.g., whether the instruction was direct or indirect, how much time a child was allowed to complete an instruction, whether or not the child had the opportunity to complete an instruction). Wruble et al. found an instruction completion mean of 6 s (range, 0.5 to 14 s) across 15 child–parent dyads. This empirically derived mean compliance latency corresponded to many of the nonempirically derived compliance criteria in the literature (Forehand & King; Peed et al.); however, because multiple manipulated variables were not systematically controlled during the instructional conditions (e.g., unclear and indirect instructions were delivered instead of clear and direct instructions, parents sometimes completed instructions for the children), more standardized and controlled assessments of compliance are needed.

A standardized and controlled assessment of compliance involves observing different children's responses to the same types of instructions in similar contexts directly, as well as using the same implementation and scoring criteria for compliance and noncompliance. This type of assessment would allow evaluation of the impact of a range of independent variables and comparison across studies conducted by different applied researchers. The use of *standardized* assessment here should not be confused with a call for a large-scale, norm-referenced analysis; we are using the term to indicate that the compliance-assessment procedures be implemented in precisely the same manner across all participants to gain a comparable measure of preschoolers' compliance. These measures should be less biased by features of the assessment context, which often vary in assessments of compliance, because relevant features of the assessment context remain invariable across administrations.

A standard tool by which preschoolers' compliance has been measured is the compliance test (Roberts & Powers, 1988). Although internal consistency and test–retest reliability have been established (Roberts & Powers), some components of the assessment compromise its ability to yield accurate compliance measures relevant to preschoolers in classrooms. In the compliance test, untrained parents instruct children to complete 30 chore-like demands in a clinic playroom devoid of competing activities (i.e., preferred toys) and social stimulation (i.e., same-aged peers). Concerns with this assessment for providing an accurate baseline of classroom compliance for preschoolers include (a) variability imposed by different parents delivering instructions across children, (b) reactivity to the clinic setting (Kazdin, 1979), (c) the lack of competing activities or peer interaction, and (d) the use of the same motor movement (i.e., pick up an item and put in a container) in all instructions. Therefore, a more relevant measure of preschooler compliance would involve conditions that more closely resemble a typical preschool classroom.

In addition to determining useful means for assessing noncompliance, applied researchers also have attempted to treat noncompliance. For example, the effects of various teacher-mediated antecedents to compliance have been evaluated. Brief, clear, and direct commands (e.g., ''sit down'') have been shown to increase compliance in preschool and elementary-aged children as well as in a teenager with Asperger syndrome (Bouxsein, Tiger, & Fisher, 2008; Forehand & McMahon, 1981; Peed et al., 1977; Roberts, McMahon, Forehand, & Humphreys, 1978) relative to more indirect and ambiguous commands (e.g., ''shape up''). In addition, ''do'' instructions have yielded greater compliance than ''don't'' instructions (Fisher, Adelinis, Thompson, Worsdell, & Zarcone, 1998; Houlihan & Jones, 1990; Neef et al., 1983; Parrish et al., 1986). Adelinis and Hagopian (1999) demonstrated that fewer problem behaviors occurred when ''do'' instructions were issued to interrupt inappropriate behavior, compared to ''don't'' instructions.

Finally, Richman et al. (2001) found that children referred for noncompliance were less likely to complete instructions as the prompt complexity increased.

A range of other variables that occur prior to the delivery of an instruction also may influence the likelihood of compliance (e.g., proximity, eye contact, physical touch, initial social interaction, interrupting an ongoing activity prior to instruction delivery), but scant evidence exists on the relative impact of these factors. Notable exceptions were provided by Hamlet et al. (1984), who found that compliance was two to three times higher when eye contact was required before instructions were given, and by Call, Wacker, Ringdahl, Cooper-Brown, and Boelter (2004), who found decreases in noncompliance when continuous adult attention was provided in the instructional context.

Several combined antecedent strategies for increasing compliance have been evaluated. For instance, Harding, Wacker, Cooper, Millard, and Jensen-Kovalan (1994) showed that an antecedent package that involved stating a participant's name, maintaining close proximity, specifying what behaviors were needed to complete an instruction, gesturing towards the materials, and modeling how to perform the instruction was effective in increasing appropriate behaviors. However, Harding et al. 's definition of appropriate behavior included behavior in addition to following instructions (e.g., asking questions relevant to the task or directions), which may have inflated the actual effects of the antecedent manipulations on compliance. In addition, the antecedent package was implemented as a single independent variable; thus, it is unclear which components of the package were responsible for increases in appropriate behavior or if all of the components were necessary. Finally, the participants in the study had been referred for problem behavior, parents implemented the procedures, and increasing compliance (specifically completing instructions) was not the main focus of their efforts. Therefore, it is difficult to discern whether these procedures would be effective if implemented by preschool teachers aiming specifically to increase compliance.

Mandal, Olmi, Edwards, Tingstrom, and Benoit (2000) evaluated the effects of more proximate antecedent variables like eye contact, praise for eye contact, directive statements, proximity to the child, and descriptive instructions on child compliance and found that this antecedent package increased compliance relative to baseline levels in 4 preschool children. In a systematic replication, Everett, Olmi, Edwards, and Tingstrom (2005) reported similar results with the antecedent package described above. However, because consequences differed between baseline and treatment conditions in both studies (i.e., descriptive praise was programmed for compliance only in treatment), the independent influence of the antecedent variables was not determinable. Thus, additional research on antecedent variables other than the form of the command and eye contact is warranted.

Other researchers have evaluated the effects of consequence-based treatments in addition to or as an alternative to antecedent-based interventions. Providing praise or other types of attention for compliance is a simple consequence-based treatment commonly used to increase compliance. Schutte and Hopkins (1970) showed that following compliance with praise (e.g., "Thank you for doing what I asked") increased compliance for 5 children from 60% to 84%. Russo, Cataldo, and Cushing (1981) found increases in compliance and decreases in nontargeted problem behaviors with 3 children when different combinations of small edible items, physical praise, and tokens were delivered contingent on compliance. Removing the negative reinforcer for noncompliance via escape extinction also has been shown to increase compliance. For instance, Zarcone, Iwata, Mazaleski, and Smith (1994) used escape extinction in the form of physical

guidance with adults with developmental disabilities and severe self-injurious behavior (SIB) to increase compliance and reduce escape-maintained SIB. Wilder et al. (2006) showed that 2 typically developing preschool children who completed instructions less than 15% of the time in baseline completed the same instructions 79% and 91% of the time, respectively, when three-step prompting (a form of escape extinction) was implemented. Others have used this same three-step prompting procedure to increase compliance in young children and adolescents (e.g., Cote, Thompson, & McKerchar, 2005; Horner & Keilitz, 1975), even when the functional reinforcer for compliance was not determined.

Although treatment packages that involve changes to both the antecedents and consequences of compliance and noncompliance have been demonstrated to be effective (e.g., Everett et al., 2005; Harding et al., 1994; Mandal et al., 2000), the compliance literature is lacking an integrative analysis of the effects of multiple antecedent- and consequence-based strategies. A logical next step in compliance research is to determine the interaction between combinations of antecedent- and consequence-based strategies designed to promote compliance with preschoolers.

A final and relatively understudied area of child compliance pertains to the integrity of procedural variables. Challenges to the integrity of procedural implementation are important to evaluate because of the potential for treatments to be compromised when implemented by teachers or other nonresearcher behavior-change agents. Vollmer, Roane, Ringdahl, and Marcus (1999) provided a model evaluation of procedural (treatment) integrity in the context of a differential-reinforcement-of-alternative-behavior (DRA) intervention for problem behavior. They found that when treatment was implemented with less than perfect integrity, inappropriate behavior increased and alternative behavior tended to persist at less than desirable levels. More recently, Wilder et al. (2006) found that compliance percentages for 2 preschool-aged children were between 79% and 91% with 100% treatment integrity, between 41% and 54% with 50% integrity, and between 0% and 6% with 0% treatment integrity, thus providing an important demonstration that treatment integrity and effectiveness were positively correlated. However, because only three integrity levels were evaluated for a single type of intervention for noncompliance, additional analyses of varying levels of integrity of different compliance treatments are warranted.

There were four purposes of the current study. First, an idiographic and standardized assessment was developed to describe the probability of compliance to teachers' instructions among 15 typically developing preschool-aged children. We identified children for whom compliance was relatively unlikely; however, none of the children in this study had been clinically referred for problems with noncompliance. An assessment of this type may extend the compliance research conducted by Roberts and Powers (1988) and mitigate the aforementioned problems with the methods of that type of compliance assessment. Then, our descriptive data were used as baselines to evaluate the impact of different levels of an antecedent intervention package designed to promote compliance by 4 of the children. Specifically, the additive effects of the antecedent variables of teacher proximity, position, physical contact, eye contact, vocal attention, and play interruption were analyzed. Next, the effects of a three-step prompting procedure were evaluated for 2 children for whom compliance did not increase to an acceptable level with the antecedent package. Finally, a parametric integrity analysis was conducted with 2 children who received a packaged intervention that included both antecedent- and consequence-based strategies to identify the level of implementation necessary to sustain acceptable levels of compliance.

Table 1
Instructional Categories, Frames, and Items

Category (two each)	Frame	Items
Gross motor	Roll the ____ to me.	Ball, car, truck
	Put the ____ in the box.	Ball, horse, and so on
	Clap your hands, wave your hands, touch your toes, stand up.	
Fine motor	Put a ____ in the ____.	Shape and shape sorter
		Peg and peg board
		Piece and puzzle
Self-help	Wipe your hands with the towelette.	Moist towelette
	Zip the zipper up to the top of the vest.	Small vest with zipper
Concept formation	Give me a [color] ____.	Plastic bear, wooden block
	Put a ____ in my hand.	Animal figure, block, and so on
Physical transition	Put the ____ on [in] the ____.	Any item, shelf, box
	Give me the ____.	

STUDY 1

Method

Participants, setting, and materials. Participants in this study included 15 typically developing children from two preschool classrooms in a midwestern child development center. The children ranged in age from 2.6 to 5.0 years of age. All had age-appropriate language skills and appeared to understand most simple one-step instructions. All children for whom we obtained parental consent and daily assent participated. Daily assent was obtained by approaching a child and asking, "Would you like to do research today?" If the child agreed, he or she participated that day, and if he or she did not agree, the researcher simply said, "Okay, maybe some other time." Children rarely declined to participate in daily sessions, although data were not collected on refusals. Daily 10-min sessions were conducted in a carpeted area of the preschool classroom during free-play times, apart from the ongoing free-play activities and other children. Two children participated in the assessment simultaneously and were allowed to play with typically available toys that could potentially compete with compliance for the duration of each session. This free-play context was arranged to approximate situations in which a typical preschool teacher delivers instructions to increase the probability that ecologically valid levels of compliance would be obtained. Instruction-related materials and instructional frames (Table 1) remained constant throughout the study and included two small balls, two small toy cars, two small toy trucks, a shape sorter with two shapes to place into corresponding holes, a peg board with two pegs, a six-piece noninterlocking wooden puzzle, a box of moist towelettes, a child-sized vest with a zipper, eight small plastic bears of two different colors, eight small wooden blocks of two different colors, four small plastic horses, and four small plastic cows. Other age-appropriate toys to occasion play within sessions included an action figure, two small dolls, two small ponies, and 30 plastic food objects. Multiple exemplars of each instruction-specific item were present so that the teacher could place a target item in front of the child before she delivered the instruction even if the other child was interacting with another one of the exemplars (e.g., the teacher instructed Alice, "Give me a red block," even though Daniel was playing with two of the four red blocks).

Measurement. One or two trained observers collected data on handheld computers during all sessions. While the teacher delivered instructions to each of the 2 children, observers recorded the amount of time between the instruction delivery and instruction completion by pressing one key (a duration key) as soon as the teacher finished delivering the instruction and pressing the same key again once the child

complied with the instruction. The observer scored an additional key (a frequency key) to indicate compliance. The observer pressed the duration key at the end of the 30-s interval (i.e., turned off the duration key) if the child did not comply with the instruction. Compliance was scored as soon as the child completed the action requested (e.g., if the teacher said "give me a bear," the observer scored compliance when the bear made contact with the teacher's hand). Compliance within 6 or 30 s was indicated in the data stream in that the frequency key had to be scored within 6 or 30 s of the onset of the instruction delivery key, respectively. Instructions completed and scored after the offset of the instruction delivery key (e.g., at 32 s) did not count as compliance. Two different sets of keys were assigned to each child so that individual data records were apparent.

Latency to comply with instructions was calculated by subtracting the time at which the teacher delivered the instruction from the time at which the child complied with the instruction. These data were used to identify the proportion of instructions that were completed within either a 6-s or a 30-s compliance criterion. These criteria were selected due to their adoption in previous compliance assessments (see Wruble et al., 1991).

Interobserver agreement. Interobserver agreement data were collected on 31% of sessions, with a mean agreement of 94%. Agreement was determined by partitioning each observation into 10-s intervals and comparing data collectors' records on an interval-by-interval basis. Within each interval, the smaller number of seconds (or responses) recorded was divided by the larger number of seconds (or responses) recorded. These quotients were averaged across intervals and converted to a percentage. Mean agreement on latency measures (onset and offset of duration keys) was 91% (range, 66% to 98%), and mean agreement on compliance measures (frequency key) was 97% (range, 72% to 100%).

Procedural integrity. Procedural integrity data were collected on teacher behavior for 21% of sessions with paper and pencil. Data collectors scored each instruction delivered as either correct (included all of the specified antecedent components and the correct consequence for compliance or noncompliance) or incorrect (one or more of the specified antecedent components was missing or an incorrect consequence was delivered). Integrity for each session was determined by dividing the number of instructions implemented correctly by the total number of instructions, and this ratio was converted to a percentage. These data were collected to determine if the teachers were implementing the designated procedures within and across sessions. Mean integrity was 99% across all sessions and teachers.

Procedure. Because we were interested in assessing child compliance within a preschool setting, we arranged for a familiar classroom teacher with whom all children had a history of receiving instructions to deliver instructions during the assessment. We also ensured that the assessment procedures were consistent across all children: The teacher gave direct instructions, provided a set amount of time for the child to comply with instructions, and never completed the instruction for the child.

A paper data sheet on a clipboard contained the 10 instructions to be delivered by the teacher. During each session, the teacher delivered two randomly selected instructions from each of five categories to each child. Teachers delivered an instruction to a child every 30 s by following a timer that signaled the delivery of instructions (i.e., because there were always 2 children, each child was given an instruction once per minute). Six different data sheets were created that contained two sets of 10 instructions (one set for each child) with randomly determined objects for use within each type of instruction. Data sheets were rotated each session so that children did not receive the same instructions in consecutive sessions.

Each child was paired with another child so that sessions were conducted with 2 children at

a time, and five sessions were conducted with each child. Members of the pairs of children changed at times across the assessment because of changes in individual child availability. The teacher invited the 2 children to sit on the floor in a carpeted area of the classroom, away from ongoing free-play activities. Prior to each session the teacher took the toys out of the box one at a time and verbally labeled each item or set of items. After the teacher removed all of the toys from the box, she told the children that they may play with any of the toys, and that they should stay in the area until she told them they were finished and it was time to clean up. The children were allowed to play with the toys for 1 min, after which the session began with an instruction to Child A (before each session, each child was arbitrarily labeled as Child A or B).

Before and while delivering each instruction, the teacher was at least 1 m away from the target child, was standing, did not touch the child, did not deliver vocal attention to the child, did not make eye contact with the child, and did not interrupt the child's play. Just before a teacher delivered an instruction to a particular child, she stated the child's name once to alert the child that the subsequent instruction was intended for him or her. Each child had 30 s to comply with the instruction, incorrectly complete the instruction, or simply not respond to the instruction. If the child correctly complied with the instruction within 30 s, the teacher immediately praised the child's behavior (e.g., "Great job, you rolled the ball to me!"). If the child did not correctly comply with the instruction (e.g., handed the wrong item to the teacher, touched the wrong body part), the teacher ignored the behavior and did not correct it. Once the approximate 10-min session was complete, the children returned to the regularly scheduled classroom activity.

Results and Discussion

The data for the 15 children in Study 1 are depicted in Figure 1. All children complied with more instructions within the 30-s criterion than within the 6-s criterion. Regardless of which criterion was applied, some children consistently complied with a high number of instructions (Jenny, Mel, and Justin), others consistently complied with a low number of instructions (Kevin and Logan), and others complied with a variable number of instructions.

Figure 2 presents the mean number of instructions with which each child complied using both the 30-s and the 6-s compliance criteria across the five sessions. Across all children, the mean number of instructions with compliance ranged from 6.6 to 9.8 with the 30-s criterion. All children complied with a mean of at least 6 of the 10 instructions with the 30-s criterion. The mean number of instructions with compliance ranged from 2.2 to 8.8 with the 6-s criterion. Only 6 of the 15 children (Jenny, Mel, Justin, Erin, Ellie, and Randy) complied with a mean of at least 6 of the 10 instructions within the 6-s criterion (Figure 2, bottom). The remaining 9 children (Andrew, Alice, Daniel, Abby, Kate, Amy, Adam, Kevin, and Logan) complied with a mean of less than 6 of the 10 instructions with the 6-s criterion.

The correlation between each child's compliance level each session and their assessment peer's compliance level for a particular session was 0.04 with the 30-s criterion and 0.33 with the 6-s criterion. These statistically insignificant and weak correlations between pairs of children suggested that assessment partners had little effect on each other's compliance levels. We also compared compliance level and child age and found a strong positive and statistically significant correlation between age and mean compliance level, $r(13) = .79$, $p < .01$. We conducted an independent samples t test to determine if there was a significant difference between mean compliance levels for boys and girls and did not find a statistically significant difference, $t(7) = 0.33$, $p > .05$.

In general, our descriptive study showed that compliance was relatively stable for individual

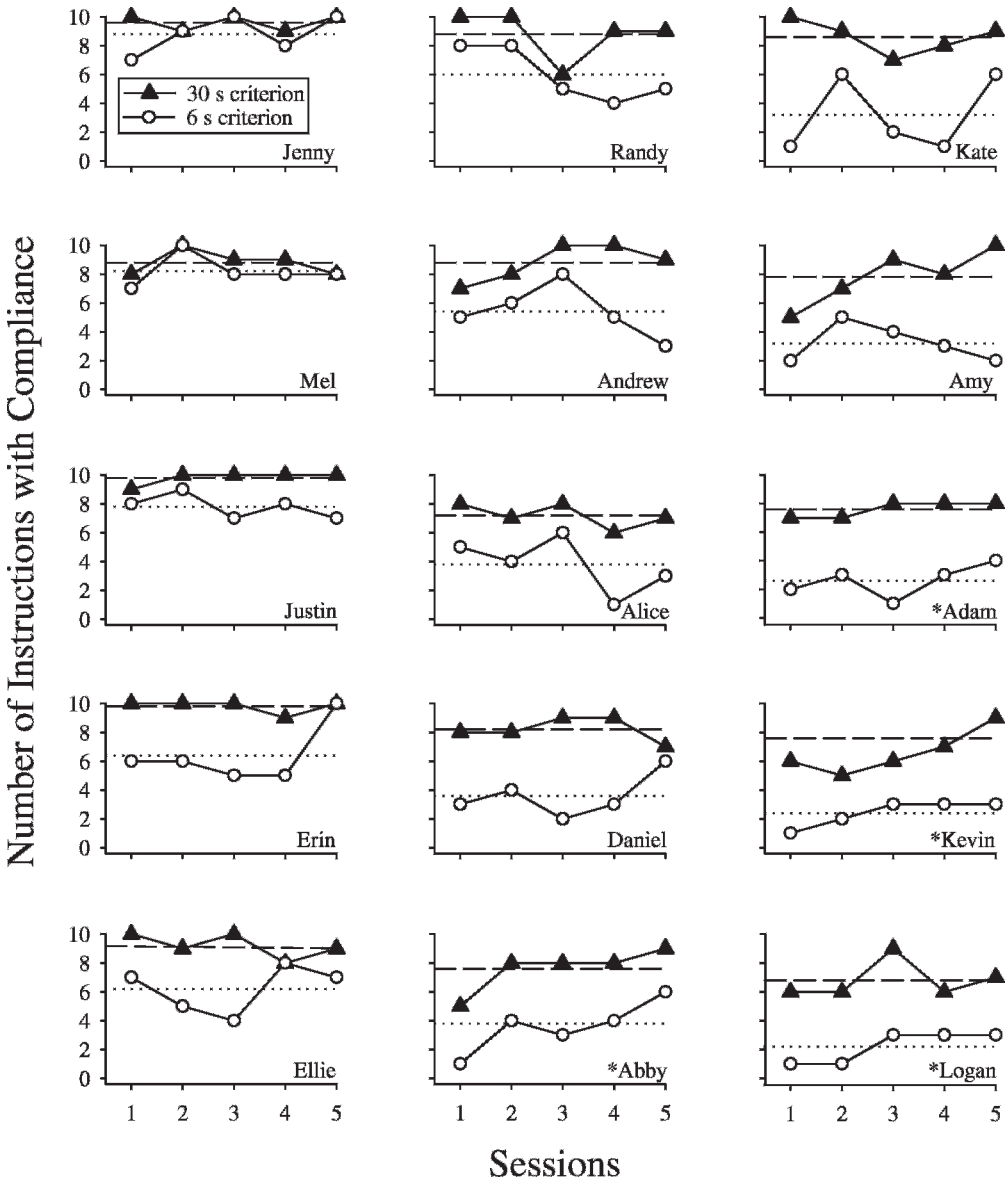

Figure 1. Number of instructions with compliance for the 15 children in each session of Study 1 according to the 30-s and 6-s criteria. Dashed lines represent the mean number of instructions with compliance within the 30-s criterion, and dotted lines represent the mean number of instructions with compliance within the 6-s criterion. Children are ordered from the highest mean number of instructions with compliance in 6 s (upper left corner) to the lowest mean number of instructions with compliance in 6 s (lower right corner). Asterisks denote the children who participated in Study 2.

children (mean *SD*s of 1.0 and 1.5 were found for the 30-s and 6-s criterion data, respectively), and that compliance was more variable across children (overall *SD*s of 1.4 and 2.6 for the 30-s and 6-s criterion data, respectively). We were able to identify children with relatively low levels of compliance, who may benefit from compliance intervention, within a small sample of typically developing children. The finding that older children complied with more instructions than younger children is consistent with previous research (Brumfield & Roberts,

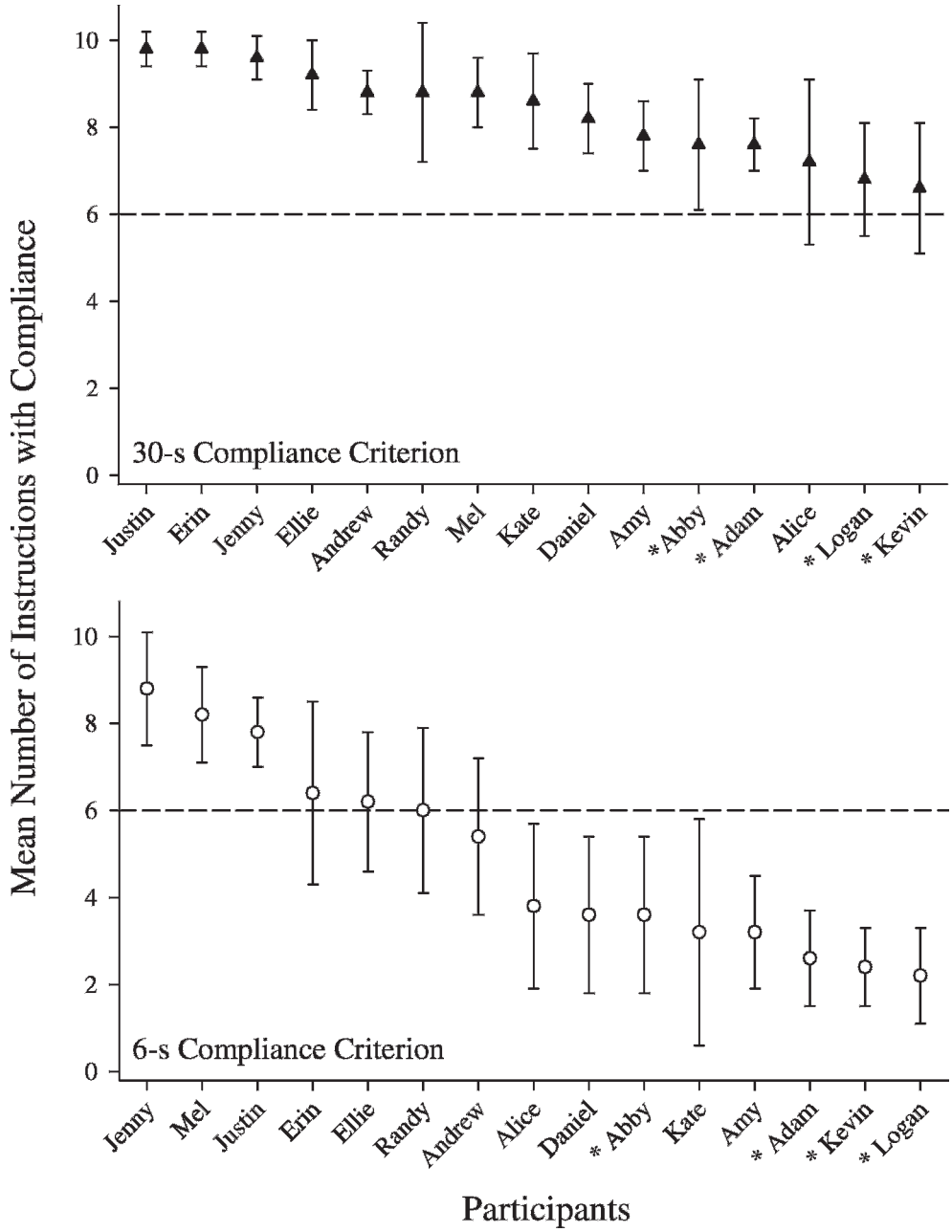

Figure 2. Mean number of instructions with compliance across the 15 children in Study 1 according to both the 30-s and 6-s criteria. In both panels, children are ordered from left to right based on the highest number of instructions with compliance within each criterion to the lowest number of instructions with compliance. Bars represent standard deviations from the mean, and asterisks denote the children who participated in Study 2.

1998; Shriver & Allen, 1997) and suggests that age of the child may be predictive of compliance level and that comparisons to similar-age peers should be made when determining desirable levels of compliance for children in compliance training programs.

An analysis of compliance across instructional categories showed that all instructions from

all instructional categories could be completed within 6 s and that no instructional category was associated with significantly higher or lower levels of compliance (data available from the second author). These outcomes suggest that low levels of compliance were a function of weak motivating operations rather than skill deficits (or faulty stimulus control).

The standardized construction of our assessment allowed us to determine the compliance level of 15 children and to make comparisons across multiple children, ages, and gender. The current study controlled for the influence of task demands in that all instructions were simple one-step instructions that could be complied with in a relatively short period of time, with similar effort; they were akin to those often given by teachers to perform simple gross and fine motor actions, common self-help tasks, identify different concepts (e.g., colors and shapes), and clean up or transition. In addition, because of the precedent in the literature to assess compliance by using clear and direct instructions (Forehand & McMahon, 1981; Peed et al., 1977; Roberts et al., 1978), the teacher delivered only instructions that were (a) clear (a specific instruction was verbally delivered), (b) brief (one short sentence in length), and (c) direct (stated as a command rather than a question, e.g., ''Give me a block'' rather than ''Will you give me a block, please?'').

There are multiple benefits to the standardized assessment used in this study. The assessment involved direct measurement of behavior but was relatively brief (approximately 50 min per pair of children). The assessment provided a sensitive snapshot of child compliance because it was conducted by an adult within the preschool classroom while children played with known peers and with developmentally relevant, typical, and presumably preferred materials. In other words, reactivity to novel settings (e.g., therapy rooms), novel materials (assessment materials), and novel instructions were minimized in this assessment.

Because noncompliance was observed in this naturalistic context, researchers interested in studying noncompliance may not need to set up contrived arrangements or issue extremely difficult instructions to evoke noncompliance. In any standardized assessment, certain contexts are inevitably left out; however, we believe that our assessment contains the most relevant features of the preschool classroom to allow valid baselines of noncompliance to be depicted.

Although the assessment has a ''natural feel'' to it, a high degree of control is also maintained such that stable baselines of compliance were generated. Applied behavioral researchers interested in assessing independent variables on preschoolers' compliance may benefit from the use of this assessment because it provides a common basis from which to evaluate independent variables on compliance. The assessment also may provide data from which a teacher or applied behavioral researcher may identify preschool-aged children who are noncompliant. As we mentioned above, kindergarten teachers rated compliance as very important (Lin et al., 2003); if we can teach children to be highly compliant in preschool, problems related to noncompliance may be prevented when children enter kindergarten classrooms (Hanley, Heal, Tiger, & Ingvarsson, 2007).

A limitation of our assessment includes the absence of additional types of instructions (e.g., instructions to transition across the room, chained instructions, complex instructions). Therefore, different forms of instructions and more challenging instructions should be evaluated in future research with preschool-aged children to better describe compliance and to identify those who may benefit from early intervention.

Although higher compliance levels were found with the 30-s criterion, it is likely that a 30-s criterion may be too liberal for a preschool-aged child to complete a simple one-step instruction such as those used in this

study. Because the 6-s criterion (a) adequately identified children with low levels of compliance, (b) is a reasonable amount of time for a child to complete a simple one-step instruction, and (c) was consistent with the descriptive assessment results of Wruble et al. (1991) and the clinical definition of noncompliance described by Forehand and King (1977), the standardized compliance assessment and the 6-s compliance criterion were used to establish baseline levels of compliance from which to evaluate the effects of antecedent- and consequence-based interventions in Study 2.

STUDY 2

Method

Participants, Setting, and Materials

Study 2 took place immediately after Study 1 was completed. Because Kevin, Abby, Logan, and Adam displayed low levels of compliance in Study 1 (i.e., less than 60% compliance within the 6-s criterion), these children were selected for participation in Study 2. Abby, Logan, and Adam were all under 3 years of age when this study began, and Kevin was 4.5 years old. In all sessions, Logan and Adam were paired, and Kevin and Abby were paired. Consent for participation was obtained from parents, and child assent was obtained prior to each daily session. The setting and materials for Study 2 were identical to those in Study 1, and instructions were delivered every 30 s.

Measurement

The same measures described in Study 1 were used in Study 2. Completion of an instruction within 6 s of the initial instruction was reported as compliance (instructions complied with after 6 s were praised but were not counted as compliance).

Interobserver Agreement

Interobserver agreement for all measures in Study 2 was determined as in Study 1. Data were collected on 36% of all sessions, with a mean agreement of 96% across all sessions. Mean agreement on latency measures was 93% (range, 74% to 99%), and mean agreement on the compliance measure was 98% (range, 87% to 100%).

Procedure

The descriptive data from Study 1 were used as the initial baseline sessions for all children in Study 2. All subsequent baseline sessions in Study 2 were carried out in the same manner as in Study 1. Kevin's and Abby's initial baselines were continued until stable levels were observed before the intervention was implemented.

Additive antecedent intervention (AAI). AAI sessions were conducted in the exact format as baseline, except that target antecedent variables (teacher behavior and proximity to the child) were implemented additively across sessions (i.e., one change per session). The first change in teacher behavior from baseline was that the teacher was within 0.3 m of the child prior to and while delivering each instruction for that particular session. The second antecedent variable was that the teacher was within 0.3 m and crouched next to the child prior to and while delivering each instruction. The third antecedent variable was that the teacher was within 0.3 m, crouched, and gently touched the child's shoulder prior to and while delivering each instruction. The fourth antecedent variable was that the teacher was within 0.3 m, crouched, gently touched the child's shoulder, and delivered approximately 5 s of vocal attention prior to delivering each instruction. Vocal attention consisted of comments directed at the target child such as, "You are playing nicely with those toys. I really like that tower you built with the blocks." The fifth antecedent variable was that the teacher was within 0.3 m, crouched, gently touched the child's shoulder, delivered 5-s of vocal attention, and attempted to make eye contact with the child prior to and while delivering each instruction (if the child did not look at the teacher, she still delivered the instruction and continued to look toward

the child's eyes while delivering the instruction). The sixth antecedent variable was that the teacher was within 0.3 m, crouched, gently touched the child's shoulder, delivered 5 s of vocal attention, attempted to make eye contact with the child, and interrupted the child's play by placing her hands over the child's hands to stop his or her play prior to and while delivering each instruction.

Following sessions in which all six antecedent variables were present, a return to baseline was conducted. After the return to baseline, the antecedent variables were implemented additively across six sessions. This process continued until both pairs of children experienced three complete phases of the AAI. Two exceptions to this general plan occurred with Kevin and Abby. In Sessions 27 through 35, the return to baseline was implemented for nine sessions rather than only one session, to determine whether baseline responding would persist at low levels over a greater time period than that of the AAI phase. In addition, once all six antecedent variables were implemented additively in the final AAI phase (Session 40), five additional sessions with all six antecedent variables present were conducted to determine if relatively high compliance levels would persist when all target antecedents were in place.

Noncompliance (consequence) intervention. Logan and Adam experienced the noncompliance intervention because their compliance had not increased after the implementation of three AAI phases. During the noncompliance intervention sessions, the teacher wore a plain red T-shirt as a discriminative stimulus for the contingencies associated with the intervention. The noncompliance intervention involved three-step prompting (initial instruction, model, and physical prompts) to promote compliance to instructions. When a child did not complete an instruction within 6 s of the initial instruction, the teacher modeled the correct response and allowed 6 additional seconds for instruction completion. If the child did not complete the instruction within 6 s after the model prompt, the teacher physically prompted the child to complete the instruction. The teacher provided descriptive praise for instruction completion within 6 s of any prompt (including the physical prompt) and ignored incorrect responses.

Full antecedent plus noncompliance intervention (FANI). FANI phases combined the full antecedent intervention, plus the noncompliance intervention, such that the teacher preceded every instruction with the implementation of all six antecedent variables and implemented the three-step prompting procedure if the child did not comply with any instruction within 6 s. The teacher provided descriptive praise for instruction completion within 6 s of any prompt (including the physical prompt) and ignored incorrect responses.

FANI challenge. FANI challenge sessions consisted of systematically removing the antecedent- and consequence-based strategies on progressively more instructions until a disruption in compliance was found. In each session of the FANI challenge phase, the integrity of the FANI was reduced by randomly selecting one of the 10 instructions to be delivered without the full antecedent intervention and then by randomly selecting one of the 10 instructions to be delivered without the noncompliance intervention for that particular session (each instruction had an equal and independent chance of having or not having the FANI in place). In the first session of this phase, nine instructions were preceded by the full antecedent intervention, and nine instructions were followed by the noncompliance intervention (if compliance was not met within 6 s). If the number of instructions with compliance remained above four for that session for one or both children, eight instructions were preceded by the full antecedent intervention, and eight instructions were followed by the noncompliance intervention in the next session. Thus, the integrity level of the FANI was reduced by one

each session until a disruption in compliance was found. At this point, sessions continued with that level of integrity until three consecutive sessions were conducted with a compliance level of four or lower, or until the compliance level increased above four for either child. If the compliance level increased, the integrity for the next session was decreased again.

Experimental Design

A reversal design was used in Study 2 to assess the relative effectiveness of the additive antecedent intervention on compliance for all participants. A reversal design also was used with Logan and Adam to determine the effects of the noncompliance intervention, the FANI, and the FANI challenge. Mean compliance at or above 60% for each member of the dyads under the 6-s compliance criterion was considered a satisfactory outcome in these evaluations.

Results and Discussion

Kevin's and Abby's data are shown in Figure 3. Before implementation of the AAI, additional baseline sessions were conducted with Kevin and Abby due to increasing levels of compliance for both children. Compliance for Kevin was low except for the last session of the first AAI phase. Compliance decreased during the return to baseline and was similar to the level in the first baseline. The next AAI phase resulted in an increasing trend in compliance. Compliance in the final baseline was low and similar to the first baseline. During the final return to the AAI, he again complied with an increasing number of instructions across the phase.

Compliance for Abby increased across the first AAI phase. In the initial return to baseline, she complied with zero instructions, and her compliance remained low in the return to the AAI phase and during the third baseline phase. During the final return to the AAI, she again complied with an increasing number of instructions across the phase.

Overall, Kevin complied with the most instructions when all six of the antecedent variables were in place, and Abby complied with the most instructions when at least five of the six antecedent variables were in place. Combined, Kevin and Abby complied with a mean of 2.6 instructions across all baseline sessions, a mean of 5.1 instructions across all AAI sessions, and a mean of 6.4 instructions in AAI phases when all six antecedent variables were present. Although the effect of the AAI was less reliable with Abby, the influence of antecedent factors on compliance was demonstrated for both children.

Figure 4 shows Logan's and Adam's data. Logan's data show no effect of the antecedent variables; he never complied with more instructions in the AAI sessions than in any of the first three baseline sessions. Across three phases of the AAI, the number of instructions with which he complied steadily decreased to and remained at zero for the last eight of the total 18 AAI sessions. Of the AAI sessions that Logan experienced, he complied with only 17 of the 180 instructions and never complied with six or more instructions in any session.

Although Adam's data were more variable, we did not observe replicable increases in the number of instructions complied with across the AAI phases relative to baseline. Of the AAI sessions that Adam experienced, he complied with only 67 of the 180 instructions and complied with six or more of the instructions in only four of these sessions.

The noncompliance intervention was implemented with Logan and Adam (Figure 4). The number of instructions with which Logan complied steadily increased with the noncompliance intervention. However, the noncompliance intervention had no effect on Adam's level of compliance relative to baseline and no improvement relative to the previous AAI phases. A return to baseline resulted in a moderate level of compliance for both Logan and Adam (both below a mean of six

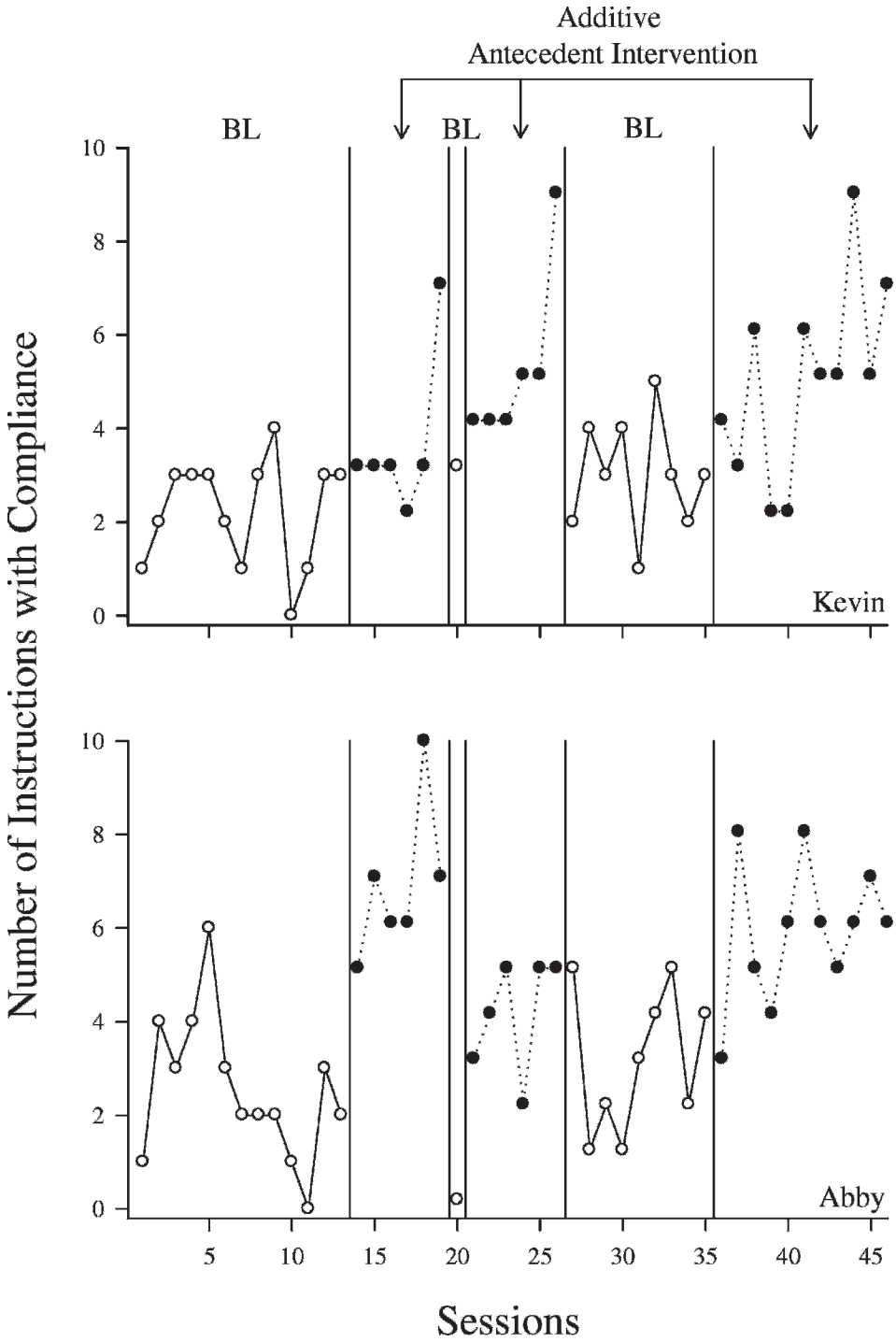

Figure 3. The additive antecedent intervention (AAI) for Kevin and Abby consisted of the additive implementation of the six antecedent variables. Baseline sessions are represented by open circles and AAI sessions by filled circles.

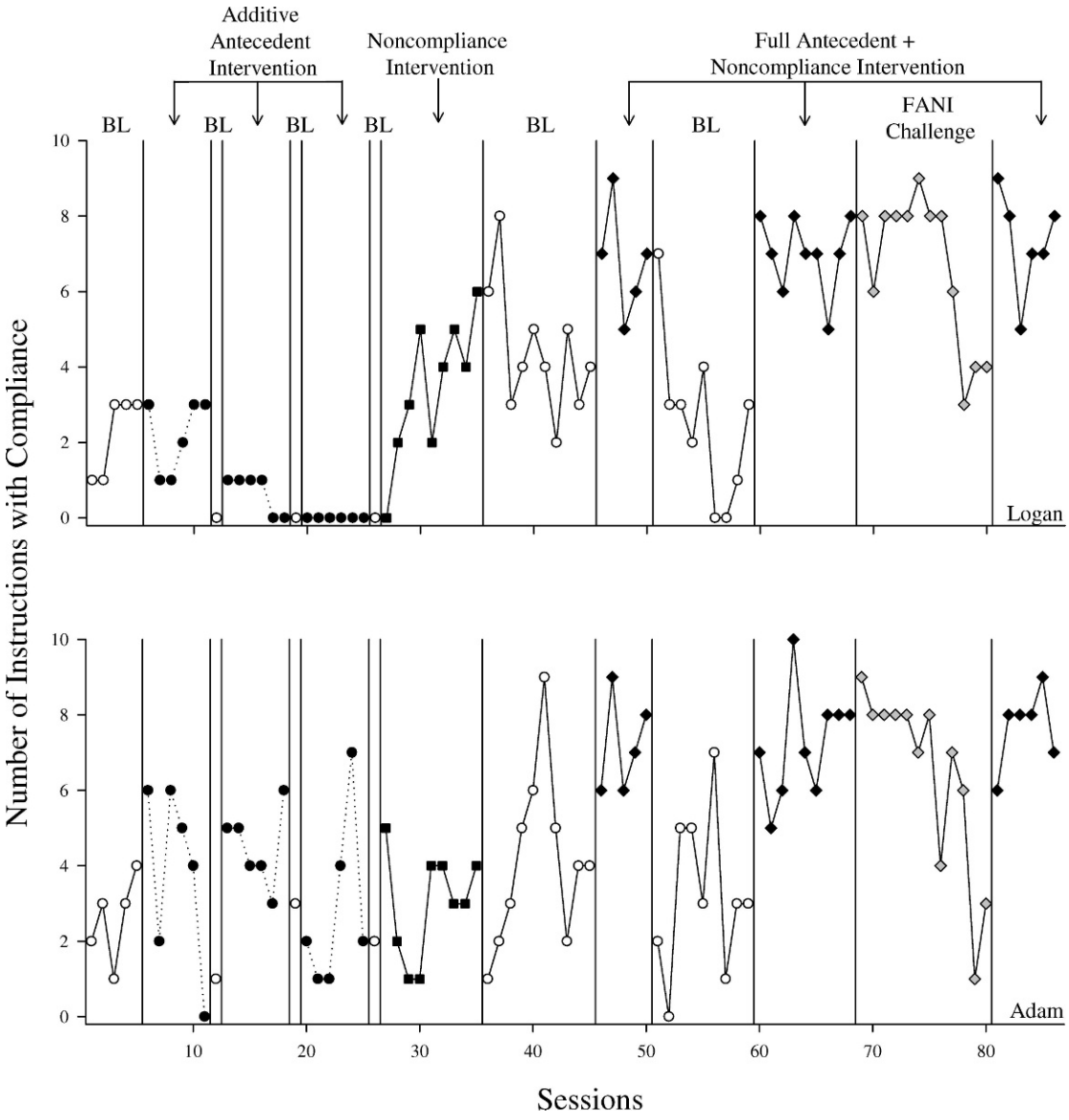

Figure 4. Data for Logan and Adam for baseline (open circles), AAI (filled circles), noncompliance intervention (filled squares), FANI (black diamonds), and FANI challenge (gray diamonds). The AAI consisted of the additive implementation of the six antecedent variables.

instructions with compliance). Although an effect of the noncompliance intervention was evident with Logan, the lack of the effect on Adam's compliance was the impetus for the implementation of the FANI with both children.

In the initial FANI phase, the number of instructions with which both children complied immediately increased relative to previous levels. Together Logan and Adam complied with 70 of 100 instructions (the highest level of compliance up to that point in the assessment). During the return to baseline, the overall number of instructions with which both children complied decreased to 52 of 180 instructions. The FANI was implemented again, and the number of instructions with

which both children complied rapidly increased to 128 of 180.

During the FANI challenge, the number of instructions with which both children complied remained at high levels until only 2 of 10 instructions were implemented with full integrity. Thus, Logan and Adam complied with 8 of the 10 instructions when only 3 of the 10 instructions were either preceded by the target antecedent variables, followed by the consequence intervention, or both. The integrity of the FANI was at 10% when the performance disruption criteria were met. In these three sessions, together Logan and Adam complied with a mean of only 3.5 instructions. A final return to the FANI effectively and rapidly increased compliance to the previously observed high levels, with compliance to 90 of 120 instructions.

In sum, the impact of six antecedent variables (proximity, position, physical contact, eye contact, vocal attention, and play interruption) was assessed on compliance by 4 children. For 2 children (Kevin and Abby), the experimental analyses showed that compliance was most probable when multiple target antecedent variables were in place, suggesting that for some children, a more involved teacher presence prior to delivering an instruction may be an important variable for increasing or maintaining compliance.

There are several possible explanations for the different effects of the AAI across the two dyads. Kevin and Abby may have been more sensitive to praise as a reinforcer for compliance than were Logan and Adam. Alternatively, Logan and Adam may have been more sensitive to escape from the instructions than were Kevin and Abby, such that not completing the instructions (and escaping the demand) was more reinforcing for Logan and Adam than for the other children. Finally, the alternative activities (e.g., playing with the toys, playing with each other) may have been more reinforcing for Logan and Adam than they were for Kevin and Abby, thus resulting in less compliance with the antecedent-only approach.

Considering the additive manner in which the antecedent variables were introduced, it is unknown whether it is necessary to implement all six variables in combination to increase compliance because it is possible that the sixth variable (play interruption) was solely responsible for the improvement in compliance. Although some of the other antecedent variables necessarily precede play interruption (e.g., moving close to the child) or are likely to precede play interruption (e.g., eye contact), the independent effects of play interruption and changes in teacher proximity seem to be the most important single variables to evaluate in future research. Nevertheless, our data show that for some children, initially devoting a few more moments to instruction delivery may have a positive effect on compliance.

Three-step prompting in combination with the six target antecedent variables (FANI phases) increased compliance to high levels for the remaining 2 children (Logan and Adam) for whom antecedent variables alone had little positive effect. It is probable that the target antecedent variables eventually served a discriminative function for Logan and Adam because they reliably preceded the three-step prompting procedure and resulted in high levels of compliance for both boys. Logan's and Adam's data demonstrate that antecedent strategies may not be effective unless they are correlated with or predictive of effective consequence-based strategies.

With these children, we carefully arranged our FANI challenge so that the target antecedent variables and the three-step prompting were systematically unrelated. We did this to ensure that the presence or absence of any particular antecedent variables was not predictive of three-step prompting, which would make it unlikely for children to respond differently when the antecedent variables were or were not in place. Because we observed high compliance levels

until treatment integrity was decreased to 20% of full strength, our data suggest that highly irregular implementation of the antecedent- and consequence-based strategies can maintain high levels of compliance following a history of this treatment package being implemented at full strength. The extent to which the success of the treatments with moderate or weak integrity depends on the recent history of the full-integrity treatment was not determined in this study, but should be evaluated in future research.

Although the single-point baselines allowed a quick assessment and detected changes in compliance, the use of single-point baselines in our antecedent evaluation is a limitation. In addition, treatment phases were brief and established only the immediate effect (or lack of effect) of specific treatment components in a specific setting. Therefore, future research should assess the general impact of effective compliance treatment packages in multiple settings and across longer periods of time.

The current study extended previous compliance research (Asmus et al., 1999; Harding et al., 1994) by assessing and improving compliance of typically developing children who had not been referred for noncompliance, by having classroom teachers implement the assessment and intervention procedures, and by explicitly focusing on compliance. The practical implication of our results is that if teachers initially deliver instructions with high integrity (all six antecedent variables and three-step prompting for noncompliance), they may be able to deliver instructions with less integrity later and still observe high compliance levels. One conundrum in the preschool classroom is that all children, regardless of developmental status, may benefit from this sort of compliance strategy, but there are simply too many demands placed on preschool teachers to implement FANI at full strength with all of the children in the classroom. Therefore, the FANI challenge results are promising in that only occasional implementation of the FANI may promote high levels of compliance. Nevertheless, this assertion regarding classwide improvements in preschoolers' compliance as a function of the FANI requires empirical inquiry. This inquiry is perhaps the most important future research opportunity.

GENERAL DISCUSSION

Noncompliance by preschool-aged children is and will likely remain a concern among teachers (Austin & Agar, 2005; Hamlet et al., 1984; Lin et al., 2003; Schutte & Hopkins, 1970). Because of its prevalence (Roberts & Powers, 1988; Webster-Stratton, 1983), the need for practical and effective methods to assess and address noncompliance surely will not dissipate any time soon. We described a standardized, idiographic, and sensitive assessment to measure compliance of 15 preschoolers directly and reliably in a short period of time. This assessment identified children who consistently complied less than their same-aged peers and served as a baseline from which to evaluate the effects of interventions for improving compliance. We also demonstrated the effects and limits of several independent variables. Our data suggest that multiple antecedent variables, including play interruption, will increase the probability of compliance, and that the probability of compliance is highest when target antecedents are correlated with follow through by teachers via three-step prompting.

It is noteworthy that none of the children consistently complied with all 10 instructions in the descriptive evaluation or under optimal treatment conditions. Increasing compliance to 100% was not the aim of our treatments. Nor, we contend, should it be the ultimate goal of compliance training, because the most compliant of preschool children do not always comply with requests and because of the potential dangers of teaching young children to respond to all requests (e.g., inappropriate requests from peers or strangers). Future research should identify methods for teaching children discrim-

inated compliance repertoires so that compliance is strong to appropriate instructions by relevant adults and weak to inappropriate instructions that may place a child in harm's way. Finally, it is important that future research also evaluate the social acceptability of the goals and procedures involved in compliance training programs with teachers, parents, and the children themselves. This may lead to improved understanding of expected compliance levels for children of different ages and the most preferred strategies for attaining those levels.

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